

Claims

1. Resonator working with bulk acoustic waves, realized in a layer structure (SA) comprising

5 - at least one first and one second electrode layer (ES1, ES2) that serve as electrodes for the resonator,

 - at least one piezoelectric layer (PS) that is arranged between two of said abovementioned electrode layers,

 wherein said layer structure is arranged on a wafer (SU),

10 wherein the total surface of said layer structure is covered with a dielectric layer (DS) and said dielectric layer is covered with a metal layer (MS),

 wherein said dielectric layer builds a hermetic encapsulation for said resonator,

 wherein the material and thickness of said dielectric layer and said metal layer are chosen in such a manner that said layers respectively represent one layer of relatively low
15 acoustic impedance and one layer of relatively high acoustic impedance and form an acoustic mirror for the bulk acoustic waves generated within said resonator.

2. Resonator according to claim 1, in which the layer thicknesses of dielectric layer (DS) and metal layer (MS) lie in the range of a quarter wave length or in the range of
20 an odd multiple of a quarter wavelength.

3. Resonator according to claim 1 or 2, in which said acoustic mirror (AS) comprises at least one other layer pair arranged above said metal layer (MS), said layer pair consisting of one layer of relatively low acoustic impedance (LI) and one layer of relatively high acoustic impedance (HI).

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4. Component having a plurality of resonators according to one of the claims 1 through 3, in which said resonators (R1, R2) are realized within said layer structure (SA) and electrically interconnected by said electrode layers (ES) and form at least a portion of a circuit,

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wherein said dielectric layer (DS) and said metal layer (MS) and, if present, said at least one other layer pair (NI, HI) cover all of said resonators and represent said acoustic mirror (AS) for them.

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5. Component according to claim 4, in which said dielectric layer (DS) is an organic layer.

6. Component according to claim 5, in which said dielectric layer (DS) comprises benzocyclobutenes.

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7. Component according to one of the claims 4 through 6, in which said dielectric layer (DS) is produced on the total surface of said wafer (SU) over all resonators (R1, R2)

and is approximately planarized, so that the layer thicknesses needed for said acoustic mirror (AS) are maintained only over said resonators.

8. Component according to one of the claims 4 through 7, in which additional
5 active or passive circuit elements (SE) of another construction style are arranged on or within said wafer (SU) and integrated together with said resonators (R1, R2) into circuits, wherein said layers forming said acoustic mirror (SA) build an encapsulation for said active or passive components and said resonators.

10 9. Component according to one of the claims 4 through 8, in which all resonators (R1, R2) and said active and passive circuit elements (SE) are integrated into a circuit on said wafer (SU), this circuit being chosen from a high-frequency circuit, adaptation circuit, antenna circuit, diode circuit, transistor circuit, highpass filter, lowpass filter, bandpass filter, filter of tunable frequency, power amplifier, preamplifier, LNA, diplexer,
15 duplexer, multifilter, coupler, directional coupler, memory element, balun, mixer, or oscillator.

10. Component according to one of the claims 4 through 9, in which other components of the same type are arranged on said wafer (SU).

20 11. Component according to one of the claims 1 through 10, in which said dielectric material of relatively low acoustic impedance is a low-k dielectric.

12. Component according to one of the claims 1 through 11, in which the material of relatively high acoustic impedance is selected from tungsten W, molybdenum Mo, gold Au or aluminum nitride AlN.

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13. Component according to claim 12, in which an aerogel, a porous silicate, an organosilicate, a siloxane derived from condensed silsesquioxanes, a polyaromatic compound, a cross-linked polyphenylene or a polymerized benzocyclobutene is selected as low-k dielectric.

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14. Component according to one of the claims 1 through 13, in which said wafer (SU) exhibits, on its surface, solderable contacts, which are connected in an electrically conducting manner to said resonators (R1, R2) or to one or a plurality of said active and/or passive components (SE) integrated with said resonators in circuits.

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15. Component according to one of the claims 1 through 13, in which said wafer (SU) exhibits, on its underside, solderable connecting terminals, which are connected in an electrically conducting manner to said resonators (R1, R2) or to one or a plurality of said active and/or passive components (SE) integrated with said resonators in circuits by means of feed-throughs within said wafer.

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16. Component according to one of the claims 1 through 14, designed as bulk acoustic wave resonator, stacked crystal filter or coupled resonator filter.